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File Code: 3420

Date: July 9, 1996

Subject: White fir needle miner defoliation in the Poison Spring and Manzanita Mountain area (Report # NE96-9)

To: District Ranger, Big Valley Ranger District, Modoc National Forest

White fir defoliation was detected by District personnel in the Poison Spring and Manzanita Mountain areas of the Big Valley Ranger District in early May, 1996. At the request of Chris Click, District Silviculturist and Timber Management Officer and Bill Merrihew, Forest Silviculturist, I conducted a field evaluation of this area on May 24, 1996. We were accompanied in the field by Dave Schultz, entomologist from the Northern CA Shared Service Area. An additional trip was made to the area the following week to fell some defoliated trees and examine them for fir engraver beetle attacks. The objectives of the evaluation were to determine the cause of the defoliation and to discuss the possibility of a subsequent increase in white fir mortality in the area.

The defoliation is caused by the white fir needle miner (WFNM), Epinotia meritana, mining within the needles (See WFNM Biology, attached). The area most heavily defoliated starts about 1 mile north of Sweagert Flat on Forest Route 22 and extends to about .5 miles northwest of the Manzanita Mountain Lookout (see attached map). The defoliated area encompasses about 1,500 acres. The stands in the area are comprised of white fir and ponderosa pine. Defoliation of the white fir in the area ranges from less than 10% to about 80% of previous years needles on individual trees. Defoliation is apparent on all size classes. The trees that have experienced heavy feeding have thin crowns. The 1996 needles were not affected as they had not flushed at the time they were examined and the WFNM generally stops feeding and begins to pupate at about the same time that the current year's foliage begins to flush in early June.

The first reported outbreak of WFNM in California occurred in 1965. About 60,000 acres were affected on the Sierra NF and adjacent area. The history of WFNM on the Modoc NF dates back to 1975 where WFNM and budworm defoliation was noted on Manzanita Mtn., around Sweagert Flats and Snell Springs. The WFNM population collapsed in 1977. Several hundred white fir trees died as a result of these outbreaks. The 1975-1977 outbreak period coincided with a fairly severe drought in most of California.

Mortality was high enough in all tree species that it was difficult to attribute the white fir mortality in the defoliated areas strictly to defoliation and/or fir engraver attacks. WFNM feeding was noted again in 1987 in the Hunters Ridge and Manzanita Mountain areas. Observations from past outbreaks on the Modoc NF indicate that defoliation occurs for 1-2 years and has resulted in minimal levels of mortality. It is likely that a temporary reduction of height and radial growth occurs as has been noted for other coniferous defoliators.

The defoliated stands and surrounding areas have experienced high levels of white fir mortality over the past few years. This increase in mortality can be attributed to several years of below normal precipitation regimes, overstocking and fir engraver beetle attacks. Current management plans for the area include salvage logging and thinning within the next 1-2 years. Management would like to capture most of the fir engraver beetle-related mortality with this entry and any additional mortality that may result from the WFNM defoliation.

At present there are no individual tree data that can be used to determine subsequent mortality based on current levels of WFNM defoliation. Some defoliated trees were felled in late May, 1996 to determine if they had been attacked by the fir engraver beetle during 1995. The only evidence of attacks were older patch kills along the bole that were beginning to callus over. The 1996 fir engraver attacks will take place from July through early September. Based on past experience, a significant increase in mortality as a result of the WFNM defoliation is not likely. There was a question of whether this situation might be different than previous defoliation episodes because the trees have been drought stressed for several years and fir engraver beetle activity in the area is higher than normal (as evidenced by an increase in top kill and mortality). Based on the facts that the past two winters have had ample moisture, and that the previous mortality has already reduced the basal area, it would be most logical to expect a small, but not significant increase in mortality.

Forest Pest Management has initiated an individual tree monitoring study in the area (See attached map, tree locations). The objective of the monitoring is to determine if WFNM defoliated trees die as a direct result of defoliation and/or are attacked and killed by the fir engraver beetle during or immediately following a WFNM outbreak. This information may be useful when developing marking guidelines for the Manzanita Mountain - Poison Springs area. The WFNM outbreak will be monitored as well to determine if the population declines within 1-2 years.

There is some current fir engraver beetle-related mortality in the area which still has merchantable volume. It would also be reasonable to expect a few additional trees to die in the area during the next 1-2 years. New marking guidelines based on the WFNM defoliation monitoring will not be available for another year or two. If management objectives for the area include salvaging to capture the mortality while it still has value, a conservative approach would be to wait until the new foliage has fully flushed and then apply the current marking guidelines. Evidence of 1996 fir engraver attacks will not be present until the period from July through early September.

If you have any questions regarding this report or seek additional assistance please contact me at 916-251-2151 ext. 6667.

Sheri L. Smith
Entomologist
NE CA Shared Service Area

Attachments

cc: Chris Click, Big Valley RD
Bill Merrihew, Modoc SO

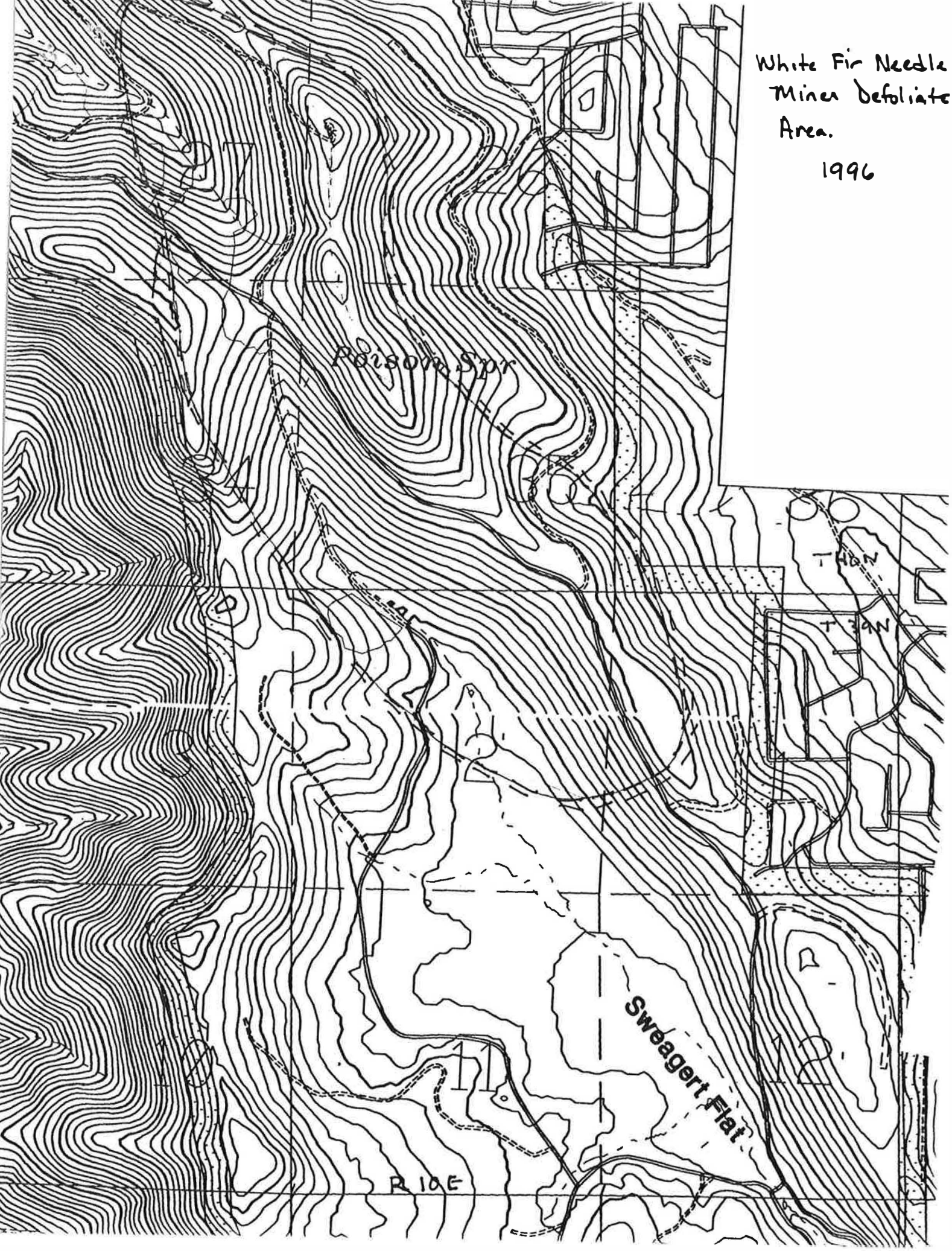
**White Fir Needle Miner**
**Biology**

The white fir needle miner (WFNM), Epinotia meritana (Lepidoptera: Olethreutidae), occurs throughout much of the the western United States and extends into southwestern Canada. Prior to the recent activity on the Modoc NF, six outbreaks have been reported; three in southern Utah, one in northern Arizona, one in central California and a previous one on the Modoc NF between 1975-1977.

The WFNM has two main hosts, white fir, Abies concolor, and red fir, A. magnifica. White fir is the preferred host in the southwestern United States. Red fir is most frequently attacked in the central Sierra Nevada Mountains of California although white fir is also infested there and in other areas of California. The life history and population dynamics of the WFNM are not known in detail but apparently vary depending on the host.

In California, the WFNM is reported to have a two year life cycle on red fir and over lapping generations in contrast with one generation per year reported for white fir in other western states. Adults fly and lay eggs in June and July. Eggs are laid near the base of the needles. Upon hatching, the larvae immediately bore into the needle (one larva per needle) and feed. Larvae feed within several needles during this life stage. Pupation usually occurs within the entrance hole of the last mined needle. The adults are small, dusty gray moths. Forewings are mottled, with patches of cream and black bands. The eggs are greenish gray and are about 0.1 mm long. Newly hatched larvae average 1.4 mm in length and are cream to yellow. Mature larvae are about 8 mm long. Pupae are orange to dark brown and average 5.5 mm long.

The WFNM outbreaks in Utah on white fir have lasted for 7-9 years, the one in Arizona about 4-5 years, the one on red fir in central California, 3-4 years and the earlier noted one on the Modoc NF lasted 2 years. The Utah-Arizona outbreaks have resulted in widespread branch dieback and mortality, primarily to codominant, intermediate and suppressed trees. Increased fir engraver beetle activity followed the 1951-57 outbreak in southern Utah. Extensive mortality to red or white fir has not been observed in California where damage was limited to foliage loss, some whole tree mortality and, presumably, a temporary reduction in radial and height growth. About 20 species of WFNM parasites have been identified but the role of natural enemies in the populations dynamics of the needle miner has not been detailed. All of the reported outbreaks have declined from natural causes; efficacy of insecticides against the WFNM has not been evaluated.


White Fir Needle Miner Defoliated Area.
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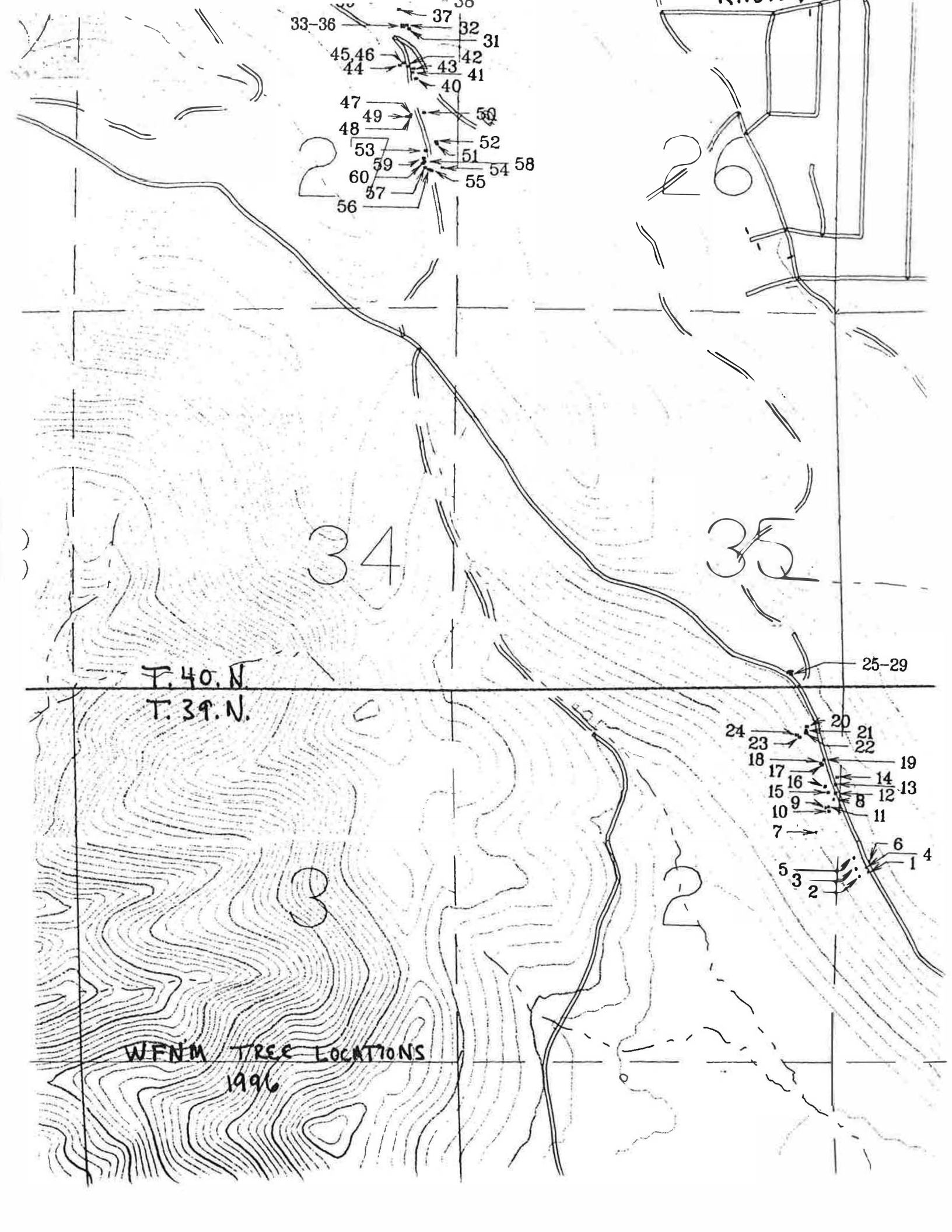
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WFNM TREE LOCATIONS
1996